

DETAILED ACTION

1. Acknowledgement is made of the amendment filed 12/23/2009.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. **Claims 1-4, 7-12, 14-17** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The limitation "just along a two-dimensional plane" is not supported by the Specification. Although the Applicants claim to have support for this limitation in paragraphs 21 and 22 of the Specifications (see page 7, first paragraph, Arguments), Examiner notes that merely pointing out the non-interchangeable use of the terms two-dimensional and three-dimensional is not sufficient to preclude using a three-dimensional image to satisfy the narrower scope of the limitation "just along a two-dimensional plane". The fact remain that a 2D plane is encompassed within a 3D scan and would therefore still be read on by a 3D scan.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. **Claims 18-22, and 24,25,27-29** are rejected under 35 U.S.C. 103(a) as being unpatentable over Hossack et al (US5873830) in view of Smith et al (US 6241675).

Regarding **claims 18, 19, and 27**, Hossack et al. teach scanning an outer region with a first spatial resolution and scanning an inner region with a second spatial resolution higher than the first spatial resolution (see abstract, lines 2-5) within the same imaging session (see col. 6, lines 1-5, refer to "real-time"); generating a first and second representation from the first and second scanning regions, respectively (refer to "real-time"; fig. 6, item 685; fig. 5; fig. 2, item 230; fig. 3, item 360); and that the regions can be three dimensional sub-volumes (col. 16, lines 44-47). Hossack et al. also discloses different lateral and angular ranges between different regions of an interleaved (composite, column 2, line 41) ultrasound image (first and second sets of different imaging parameters, column 2, lines 45-65).

Arguably, Hossack et al. may fail to teach scanning within a three dimensional sub-volume. Smith et al discloses scanning within a three-dimensional sub- volume. It would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Hossack et al. to scan within a three-dimensional sub-

volume, as taught by Smith et al, in order to provide the operator with a clearer view of the underlying anatomy. Furthermore, using higher spatial resolution in the sub-volume than in the volume is an obvious modification in order to distinguish fine anatomical detail within the sub-volume and coarse anatomical detail within the volume.

Regarding **claims 20-22**, Hossack et al. teaches the inner region being a smaller lateral range than the outer region (see at least col. 6, lines 41-58, refer to the use of scan lines inside and outside the regions of interest).

6. **Claims 1-4, 7-12, 14-17**, are rejected under 35 U.S.C. 103(a) as being unpatentable over Hossack et al. in view of Smith et al. as applied to claims 1 and 10 above, and further in view of Robinson et al (US6582367).

Regarding **claims 1, 2, 4, 7-12, 14-17**, Hossack et al. and Smith et al. teach the limitations as discussed above but fail to explicitly teach using a B-mode display for the two-dimensional image and using a color Doppler display for the three-dimensional image. Robinson et al. teach that the two-dimensional and three-dimensional images may be obtained using B-mode and Doppler processing (The beamformed signals are B mode or Doppler processed by a signal processor (206), column 7, line 5-6) and that the modes used for the two images may be different (three-dimensional harmonic image ... and two dimensional Doppler flow image, column 6, lines 66-68 and column 7, line1), and that color Doppler mode may be used (Doppler ensembles for colorflow processing, column 8, line 57). Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Robinson et al. to use a B-

mode display for the two-dimensional image and to use a color Doppler display for the three-dimensional image because the color Doppler display is necessary to accurately visualize flow directions in three dimensions and the B-mode display is sufficient to distinguish gross anatomical features in the vicinity of the vasculature being imaged in three dimensions.

Specifically regarding **claims 1, 2, 11, and 12**, Hossack et al. teach that the first and second scanings can be a volume and sub-volume, respectively (col. 16, lines 44-47). A scanning involving a 3D volume would involve at least one scanning along a 2D plane.

Specifically regarding **claim 7, 15, 24, and 28**, and as applied to claim 18 above, Hossack et al. teach setting the sub-volume size as a function of user input (col. 2, lines 56-65).

Specifically regarding **claim 8-10, 16, 25 and 29**, Hossack et al. teach the parameters being different for the volume and sub-volume (col. 2, lines 30-53).

Specifically regarding **claim 17**, the steering angle would be determined by the control unit and determined based on the user-defined region of interest.

Specifically regarding **claim 4**, Hossack et al. teach different lateral and angular ranges between different regions of an interleaved (composite, column 2, line 41) ultrasound image (first and second sets of different imaging parameters, column 2, lines 45-65). It would have been obvious to a person having ordinary skill in the art at the time the invention was made to use different lateral and angular ranges for different

parts of an interleaved (composite) image in order to improve spatial and/or temporal resolution inside a region of interest, as taught by Hossack et al (see abstract).

Regarding **claim 3**, Hossack et al. and Smith et al. teach the limitations as discussed above but fail to explicitly teach scanning over a 90 degree sector region. Robinson et al further discloses scanning over approximately a 90 degree sector (Figures 11 and 12). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to include scanning over approximately a 90 degree sector in order to adequately scan an entire region of interest (for motivation see at least fig. 11 & 12).

Response to Arguments

7. Applicant's arguments filed 12/23/2009 have been fully considered but they are not persuasive.
8. Applicants argue that the newly amended limitation "just along a two-dimensional plane...the scanning being in a two-dimensional scan format" overcomes the references (page 7-8, Arguments). Examiner notes that this limitation would still be met because any 3D scan format would necessarily encompass a plurality of 2D scans. Furthermore, the limitation of "just along a two-dimensional plane" is not supported by the Specification (see above 112 1st paragraph rejection). Although the Applicants claim to have support for this limitation in paragraphs 21 and 22 of the Specifications (see page 7, first paragraph, Arguments), Examiner notes that merely pointing out the non-interchangeable use of the terms two-dimensional and three-dimensional is not

sufficient to preclude using a three-dimensional image to satisfy the narrower scope of the limitation "just along a two-dimensional plane". The fact remain that a 2D plane is encompassed within a 3D scan and would therefore still be read on by a 3D scan.

9. Applicants argue that Hossack et al. do not teach separate formation of three-dimensional representations (page 8, last paragraph - page 9, first paragraph, Arguments). Furthermore, the claims and specifications of the instant application are not specific as to how Applicants intend for the images to be formed separately. Therefore, the limitation can still be read on by Hossack et al. An imaging procedure contains many different steps, such as data acquisition, pre-processing steps, post processing steps, reconstruction steps, display steps, etc. The limitation "formed separately" can be a variation of any of these steps. The limitation can also refer to a difference in spatial formation, temporal formation, and/or even formation using a completely different set of imaging equipment. Therefore, it can be said that Hossack et al. at the very least produces a separate formation because different parameters are used for the scan of the ROI of the image (page 8, last paragraph, Arguments).

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ELMER CHAO whose telephone number is (571)272-0674. The examiner can normally be reached on Mon-Thurs 11am-9pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Casler can be reached on (571)272-4956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/BRIAN CASLER/
Supervisory Patent Examiner, Art
Unit 3737

/E. C./
Examiner, Art Unit 3737